

# A posteroseptal accessory pathway located in a coronary sinus aneurysm: diagnosis and radiofrequency catheter ablation

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## Abstract

**A coronary sinus aneurysm was diagnosed by means of echocardiography, coronary sinus contrast angiography, coronary angiography, and nuclear magnetic resonance imaging in a patient with Wolff-Parkinson-White syndrome caused by a posteroseptal accessory pathway. Percutaneous radiofrequency current catheter ablation performed in the isthmus of the coronary sinus aneurysm was successful.**

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In recent years curative percutaneous radiofrequency current ablation has been used with great success in patients with Wolff-Parkinson-White syndrome.<sup>1</sup>

In patients with posteroseptal accessory pathways the procedure is often performed by positioning the ablation catheter along the tricuspid annulus near the coronary sinus orifice. There is an association between posteroseptal accessory pathways and coronary sinus aneurysms.<sup>1-3</sup> A coronary sinus aneurysm was found in six (9%) of 65 patients with posteroseptal accessory pathways who underwent surgical ablation.<sup>5</sup> The malformation was also diagnosed at necropsy in patients who died suddenly from cardiac arrhythmias caused by Wolff-Parkinson-White syndrome.<sup>1-3</sup> Most recently, catheter ablation with low energy DC shocks was successful in a patient with a posteroseptal accessory pathway associated with a diverticulum of the coronary sinus.

We report a patient in whom a posteroseptal accessory pathway located in a coronary sinus aneurysm was diagnosed by coronary sinus contrast angiography, coronary angiography, echocardiography, and nuclear magnetic resonance imaging. Radiofrequency current applied in the isthmus of the aneurysm successfully ablated the accessory pathway.

## Case report

The patient, a 26 year old man, had had symptoms from the age of eight with attacks of palpitation and dizziness usually evoked by strenuous exercise. Eleven years before his admission Wolff-Parkinson-White syndrome was diagnosed (fig 1).

He was treated with verapamil, flecainide, and then amiodarone without success. Paroxysms with atrial fibrillation and broad irregular QRS complexes and a heart rate of 280-300 beats per minute occurred once or twice a year: usually DC cardioversion was necessary. The patient was referred to us for ablation. An electrophysiological study confirmed the presence of a posteroseptal accessory pathway with both anterograde and retrograde conduction properties. The effective refractory period of the accessory pathway was less than 200 ms. Several times during the study the patient went into atrial fibrillation and had to be cardioverted. The accessory pathway was mapped with a deflectable Mansfield catheter with a 4 mm tip (Mansfield-Webster, Boston Scientific, Watertown, MA, USA), and the shortest atrioventricular and ventriculoatrial intervals as well as a discrete accessory pathway potential were recorded in the coronary sinus 1-2 cm distal from the orifice.

Radiofrequency ablation was attempted with the mapping catheter at several sites along the posterior tricuspid annulus and around the orifice of the coronary sinus without success. Because the failure of the ablation suggested a coronary sinus aneurysm we obtained an angiogram of the left coronary artery and the coronary sinus. This showed a 2 x 3 cm aneurysm of the coronary sinus

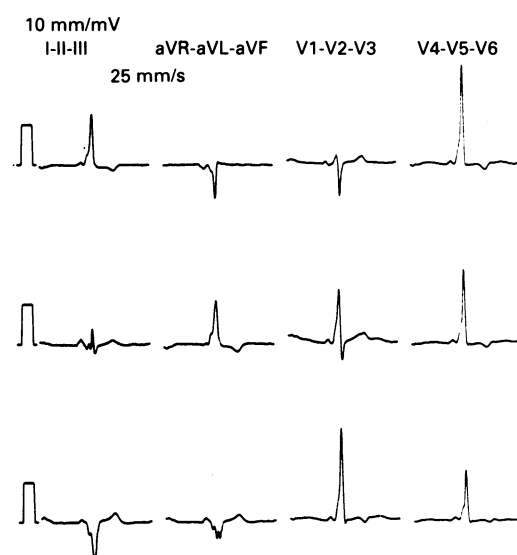
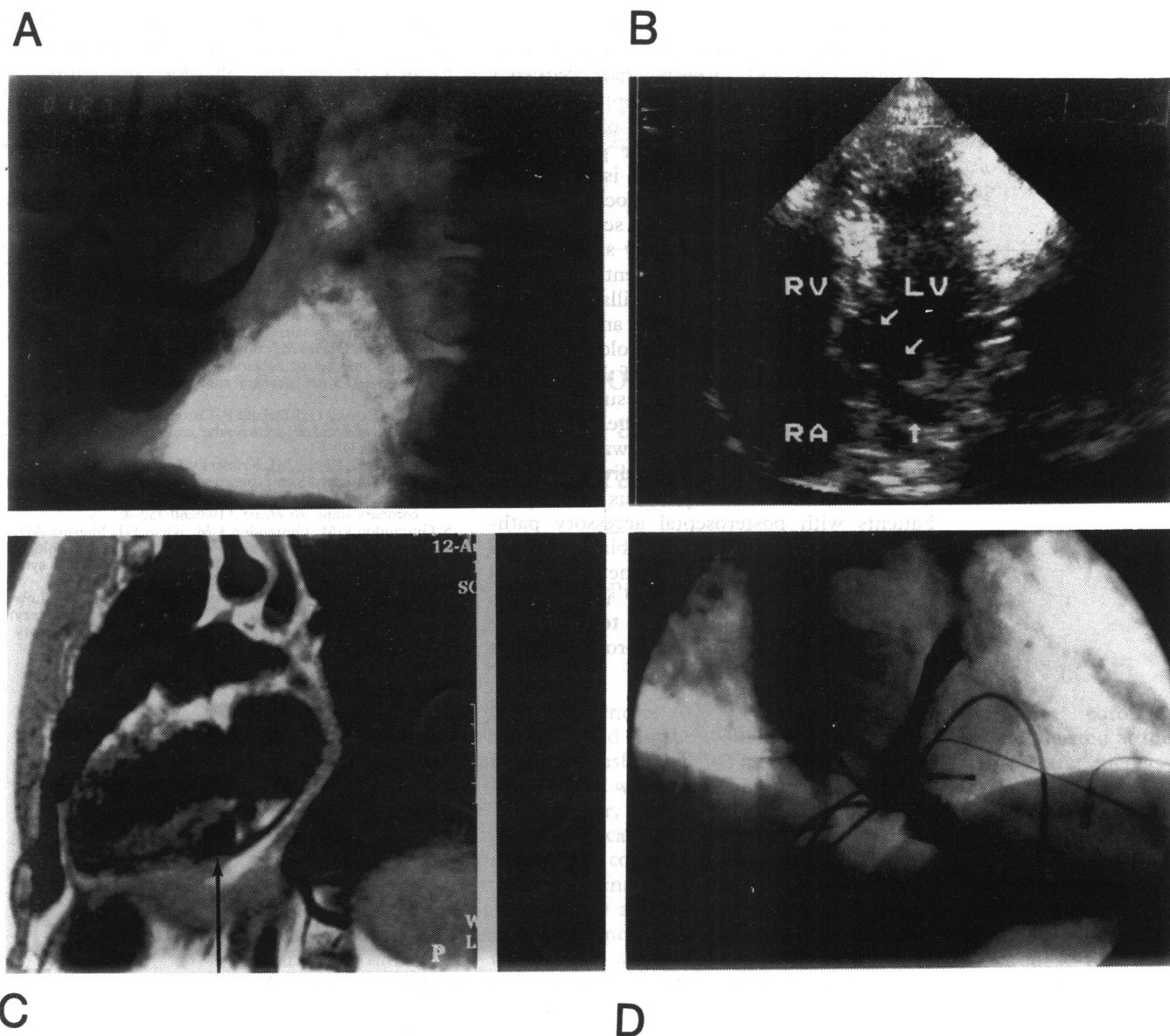


Figure 1 Twelve lead electrocardiogram before radiofrequency ablation showing preexcitation pattern suggesting a posteroseptal accessory pathway.

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**Figure 2** (A) Coronary sinus angiogram (left anterior oblique projection) showing the coronary sinus and the aneurysm of the coronary sinus with a dividing septum and a narrow isthmus. (B) Cross sectional echocardiogram showing the coronary sinus aneurysm divided by a septum (oblique arrows) and the coronary sinus proper (vertical arrow). LV, left ventricle; RV, right ventricle; RA, right atrium. (C) Nuclear magnetic resonance image of the heart showing the coronary sinus aneurysm with the communication to the coronary sinus proper (arrow). (D) Coronary sinus angiogram (right anterior oblique projection) showing the position of the ablation catheter in the isthmus of the coronary sinus aneurysm. Two standard electrode catheters were placed in the right ventricular apex and on the His bundle respectively.

with a narrow isthmus and a septum dividing the aneurysm (fig 2A), which extended apically on the inferior surface of the left ventricle along the course of the posterior descending coronary artery. The aneurysm showed contractile systolic movements, almost like a rudimentary ventricle, and it was filled in late diastole from the distal coronary sinus. A standard Doppler echocardiographic examination including a transoesophageal echocardiogram confirmed the location, anatomy, and pulsatile flow in the two orifices (fig 2B).

Nuclear magnetic resonance imaging showed an aneurysm with a thin epicardial surface and a somewhat muscular isthmus (fig 2C). It also showed a pulsatile pattern of flow into the aneurysm.

At a second radiofrequency ablation procedure one week later, the ablation cath-

eter was advanced into the isthmus of the aneurysm and positioned in the narrowest part of the proximal opening (fig 2D). After a few attempts with scrupulous mapping around the circumference, a successful ablation at 20 W for 30 s was performed with the result that the delta wave disappeared after 2 s. After this attempt only normal anterograde and retrograde conduction over the His bundle was demonstrated. The patient was mobilised a few hours after the procedure and remained haemodynamically stable without any symptoms. The following day an echocardiogram showed no signs of pericardial effusion. At a three month follow up investigation the electrocardiogram was normal and the patient had resumed normal physical activity with no paroxysms of tachycardia.

### Discussion

The present case shows that it is possible to perform safe and curative radiofrequency catheter ablation of a posteroseptal accessory pathway located in the isthmus of a coronary sinus aneurysm. Moreover, the present case shows for the first time that it is possible to diagnose the anomaly by echocardiography and nuclear magnetic resonance scanning.

The present case is clinically similar to 10 earlier cases.<sup>1-6</sup> Thus our patient was young and had paroxysmal atrial fibrillation with a very rapid ventricular response and near syncope. During the electrophysiological study the effective refractory period of the accessory pathway was very short. In summary, we report a case of successful catheter ablation of a posteroseptal accessory pathway in which radiofrequency current was delivered in the isthmus of a coronary sinus aneurysm. Patients with posteroseptal accessory pathways who are candidates for ablation with a radiofrequency current catheter should undergo an echocardiographic investigation before the ablation procedure to verify the possible presence of a coronary sinus

aneurysm. If an aneurysm is found, coronary sinus contrast angiography should be performed during the ablation procedure to locate the isthmus of the aneurysm, because it is the most likely site for catheter ablation. Finally, we regard it less hazardous to deliver radiofrequency current than low energy DC shocks in coronary sinus aneurysms because they often have thin walls.

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